

A rare plant found near the junction of river goes to sea on sandy areas among the other bushes. Few plants were seen at single spot.

Fl. & Fr.: August (Seen the plant in flowering and fruiting in December)

Distribution: Mochemad-Vengurla.

Specimen Examined: BGG - 2974 (BLAT)

This is the first report of this species after a gap of 145 years. It was reported by Dalzell & Gibson in Bombay Flora in 1861 based on collection of the species between Vengurla and Malvan. However, no specific locality has been given by Dalzell. Dalzell reported the flowering period of the plant as August, in rainy season, but I have seen the plant flowering and fruiting during December, in winter season. I have collected the specimens and taken the photographs of the same (Eds: photographic evidence provided).

In the FLORA OF SINDHUDURG DISTRICT (55,1988), Mr. B.G. Kulkarni reported this species, on authority of Dalzell. In FLORA OF MAHARASHTRA Vol. I: 175, 1996), M.R. Almeida has reported this plant on the authority of Dalzell, as well as in the FLORA OF MAHARASHTRA (Vol.1: 411, 2000) published by BSI. No other collector has been able to locate this species in Konkan. I have located this species while doing the plant survey of Vengurla taluka for my Ph.D. Degree.

ACKNOWLEDGEMENTS

I sincerely thank my guide Dr. S.M. Almeida for help in determination of the species, Dr. M.R. Almeida for the assistance provided in the confirmation of the species and Dr. U.C. Bapat, the Director, Blatter Herbarium, St. Xavier's College, Mumbai for facilities rendered during my work.

19. A NEW RECORD OF *MONOTROPA HYPOPITYS* L., A MYCO-HETEROTROPHIC PLANT FROM INDIA

S.K. BARIK^{1,3}, N.J. LAKADONG^{1,4}, R. BAISHYA^{1,5}, A. CHETTRI^{1,6}, P. DAS^{1,7}, H. KAYANG^{1,8} AND D. MARBANIANG²

¹Department of Botany, North-Eastern Hill University, Shillong 793 022, India.

²Centre for Environmental Studies, North-Eastern Hill University, Shillong 793 022, India.

³Email: sarojkbarik@gmail.com

⁴Email: nigyall@yahoo.co.in

⁵Email: ratul_nehu@yahoo.co.in

⁶Email: sentin_chettri@yahoo.co.in

⁷Email: panna1d@yahoo.com

⁸Email: hkayang@yahoo.com

A myco-heterotrophic plant *Monotropa hypopitys* L. is reported for the first time from India. The illustration, phenology, range of occurrence and conservation threat of the species have been presented in this paper.

About 400 species of vascular plants under 87 genera are achlorophyllous and heterotrophic, but not directly parasitic. These plants are unable to assimilate carbon by themselves and are mostly dependent on fungal association for nourishment. Hence, these saprophytic plants are called as myco-heterotrophic plants. Most myco-heterotrophic plants are restricted to the tropics and the diversity in terms of number of species and families is maximum in the Palaeotropical region (Leake 1994). The members belonging to the genus *Monotropa* are achlorophyllous, myco-heterotrophic plants. The subfamily Monotropoideae of Ericaceae consists of 10 genera and 12 species (Wallace 1975). *Monotropa* has a wide distribution throughout Europe, North America and Asia, with a circumboreal distribution extending northward almost up to the Arctic Circle (Wallace 1975). It is also found in far south, such as Mexico, Panama and Colombia (Maas 1986). However, in India, *Monotropa* is

restricted to temperate Himalayas in Garhwal and Kumaon (Strachey 1974) and Khasi Hills (Hooker 1882; Haridasan and Rao 1985). Of the two species of *Monotropa*, namely *M. hypopitys* and *M. uniflora*, only *M. uniflora* has so far been recorded from these areas. While reporting *M. hypopitys* from China, Wallace (1975) included India as one of the countries where the species can be found. However, there was no mention of specific locality. Other than this, there is no published report on occurrence of *M. hypopitys* in India till date.

While establishing the identity of the species, the authors came across two specimens of the same species, one from Naga hills with collection No. 17636 (ASSAM) deposited by N.L. Bor in September, 1936, and another from Salari forest in East Kameng district of Arunachal Pradesh with collection No. 39961 (ASSAM) deposited by J. Joseph in September, 1964. However, the species was never collected from Meghalaya and was never published describing its occurrence in India.

Monotropa hypopitys was discovered during the floristic exploration in two sacred forests of Meghalaya.

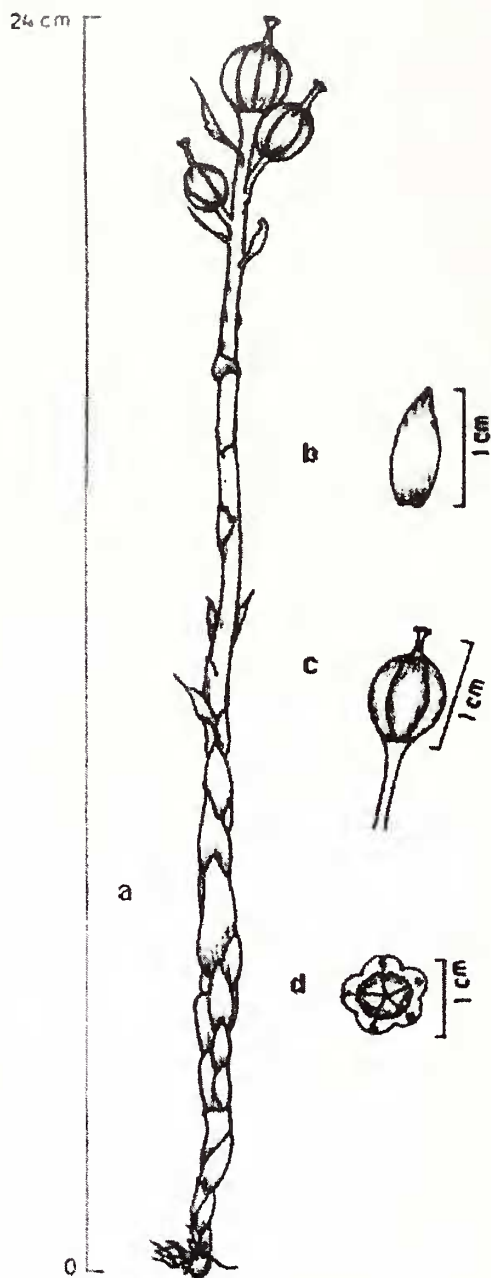


Fig. 1: *Monotropa hypopitys*: a. habit; b. bract; c. mature ovary and d. T.S. of ovary (Scale bar: a = 240 mm & b-d = 10 mm)

The identity of the species was established after comparing it with the two herbarium sheets deposited by Bor (1936) and Joseph (1964) mentioned above and consulting the FLORA OF CHINA (Zhengyi *et al.* 2005). The voucher specimen was deposited in Botanical Survey of India, Eastern Circle Herbarium (Assam), Shillong. The species is confined to two sacred forests, namely Mawphlang (25° 36. 810' N; 91° 54.113' E; 1,427 m above msl), and Upper Shillong (25° 32.223' N; 91° 51.231' E; 1,899 m above msl).

Monotropa hypopitys L., Sp. Pl. 1: 387. 1753.

Plant annual, pale yellow-brown, fleshy, brown-black

when dry. Inflorescence racemose, rarely reduced to a solitary flower, 5-35 cm long from root connection, 1-10 mm diameter, below the lowermost flower glabrous, emerging from soil in nodding position; bracts on axis below soil level, shorter and thicker and more densely crowded than upper bracts, elliptic to ovate, 8-15 x 3-15 mm, margins erose, irregularly toothed; pedicels slender, 2.5-15 mm long, up to 36 mm in fruit, 1-2 mm in diam., finely pubescent to nearly glabrous, glandular; bracteoles sometimes present, 9-14 x 4-10 mm. Flowers cylindric, often constricted distally; calyx distinct from corolla, sepals 4-5 or occasionally, 7-12 x 1-5 mm, usually pubescent within; corolla of 4-5 petals divergent at apices, 8-17 x 4-8 mm, oblong to oblanceolate, narrowly saccate at constricted base, rounded to acute at apices, usually reflexed at tip; stamens 8-10 in two series of alternating lengths, 5-14 mm long; anthers hippocrepiform, 0.8-1.5 mm long, dehiscent by a single terminal slit over the connate sacs; ovary 6-12 x 5-9 mm, usually pubescent, locules 4-5, stigma umbilicate, funnel form, 1.5-3.0 mm in diam., often subtended by a ring of stiff hairs; style uniformly slender, joining abruptly with ovary, 2-10 x 1-2 mm. Capsule erect, broadly ellipsoid, 5-10 x 5-9 mm (Fig. 1 and Table 1).

Specimen Examined: Naga hills, Nagaland, Bor 17636 (Acc. No. 6405-Assam), Salari, West Kameng district, Arunachal Pradesh, Joseph 39961 (Acc. No. 39797 Assam).

Fl. & Fr.: Fl. July-September and Fr. September-October.

Table 1: Distinguishing features of *M. hypopitys* L. and *M. uniflora* L.

<i>M. hypopitys</i>	<i>M. uniflora</i>
Herbs pale yellow-brown	Herbs white when fresh, black when dry
5-45 cm high	5-30 cm high
Inflorescence racemose, rarely scapose	Inflorescence erect scapose
Petals and sepals distinct in texture and appearance, narrowly saccate at base	Petals and sepals similar in texture and appearance, broadly saccate at base
Nectar lobes short, stout	Nectar lobes elongate, cylinder,
Capsular walls thin, segments often deciduous at maturity	Capsular walls stout, segment persistent
Fruits many	Single fruit
Ovary 6-12 x 5-9 mm	Ovary 2-10 x 1-2 mm

Ecology: The species grows on leaf litter as well as on the roots of *Quercus* spp. and the members of Family Lauraceae such as *Cinnamomum glanduliferum* (Wall) Meissn and *Persea odoratissima* (Nees) Kosterm. The fungal species that had mycorrhizal association with *M. hypopitys* were *Russula lepida* Fr., *Boletus luteus* L., *B. edulis* Bull. and *Tricholoma saponaceum* (Fr.) P. Kumm. The other fungal species present in the litter were *Scleroderma aurantium* (L.) Pers, *Amanita phalloides* (Vaill ex. Fr.) Link and *Hygrophorus limacinus* Kalchbr.

Distribution: China, Bhutan, Myanmar, Thailand, Russia, Pakistan, Europe, North America, Mexico and India.

Threat status: Following IUCN classification scheme Version 3.1 (2001), the species is assigned to the category 'Critically endangered'.

Being an achlorophyllous plant, *Monotropa hypopitys*

depends on its association with mycorrhizal fungi for nutrition, which in turn are usually associated with the roots of selected tree species. The survival and reproduction of *M. hypopitys* seems to be extremely sensitive to forest microenvironment that encourages the mycorrhizal association between the angiosperm tree roots and fungi. Thus, the protection of the habitat holds key to the species conservation.

ACKNOWLEDGEMENTS

We thank the Director of the Botanical Survey of India, Eastern Circle, Shillong, for allowing us to consult the herbaria and identify the species. The second, third, fourth, fifth and seventh author gratefully acknowledge the University Grants Commission, New Delhi, for financial assistance in the form of fellowship.

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20. DOES *ACHYRANTHES BIDENDATA* BLUME (AMARANTHACEAE) OCCUR IN ANDAMAN & NICOBAR ISLANDS?

L. RASINGAM^{1,4}, P.G. DIWAKAR^{2,5} AND SHUBHANGI INGOLE³

¹Botanical Survey of India, Andaman & Nicobar Circle, Port Blair 744 102, India.

²Botanical Survey of India, Western Circle, Pune 411 001, Maharashtra, India.

³Bar. R.D.I.K. and N.K.D. College, Badnera-Amravati, Maharashtra, India.

⁴Email: rasingam@gmail.com

⁵Email: pgdiwakar@hotmail.com

The species *Achyranthes bidendata* Blume is widely distributed in the tropical countries mainly in Africa and Asia. In India, the species has been reported throughout the country from sea level to 1,000 m altitude. Vasudeva Rao (1986) reported this species from Nicobar Islands based on the earlier collections deposited in the Botanical Survey of India regional herbarium, Port Blair (PBL). Later, Sinha (1999) included it in his work based on the above report and collections. A critical examination of earlier collections with relevant literature reveals that all the specimens hitherto identified as *Achyranthes bidendata* Blume in PBL belong to *Cyathula prostrata* (L.) Blume. The genus *Cyathula* is closely allied to the genus *Achyranthes* L., but differs from it by having rhombate leaves and fascicled

hooks around the glomerules of flowers. Thus, *Achyranthes bidendata* Blume may not occur on Andaman & Nicobar Islands. The present paper gives nomenclature and concise description of *Cyathula prostrata* together along with its distribution in the world and habitat.

Cyathula prostrata (L.) Blume, Bijdr. 549. 1825; Hook. f., *Fl. Brit. India* 4: 723. 1885; Ridl., *Fl. Malay Penins.* 3: 7. 1924; Backer in Steenis, *Fl. Males. Ser. 1, Spermat.* 4: 82, t. 4. 1949; Larsen in *Fl. Thailand* 5(4): 393, t. 86 (7-13). 1992. *Achyranthes prostrata* L. Sp. Pl. ed. 2, 296. 1762. *A. bidendata sensu* Vasudeva Rao in *J. Econ. Taxon. Bot.* 8: 140. 1986; Sinha, *Fl. Great Nicobar Isl.* 351. 1999. (*non* Blume, 1826).

Erect or prostrate herb, up to 80 cm high; stem reddish-